EXHIBIT C

IN THE UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF TEXAS HOUSTON DIVISION

NALEX ENERGY, LLC,	§	
Plaintiff,	§	
	§	**CIV. NO. 4:22-cv-01824**
VS.	§	
	§	**FED. R. CIV. P. 9(h)**
LAURITZEN BULKERS A/S,	§	**Admiralty Claim**
Defendant.	§	

LAURITZEN BULKERS A/S,	§
Defendant and Third-Party Plaintiff,	§
	§
VS.	§
	§
KIRBY INLAND MARINE LP,	§
Third-Party Defendant.	§

CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

AFFIRMATION OF PIERRE DE JAGER

I, PIERRE DE JAGER, AFFIRM AND STATE THE FOLLOWING:

1.0 INTRODUCTION

1.1 I, Pierre de Jager (MChem, MRSC, RSci), am the Director of the Oil and Chemicals Department at CWA International Ltd ("**CWA**"). During my 12 years at CWA, I have dealt with multiple matters involving various bunker fuel oil grades. I attach a copy of my Curriculum Vitae to this report as **APPENDIX I**.

1.2 My specific experience, relative to this dispute, includes the investigation of over 250 matters regarding off-specification bunker fuel as well as attending several joint witnessed analyses, including investigation of several alleged elevated catfine matters as well as giving evidence in London Arbitration, London High Court, and Singapore Arbitration.

1.3 I have been asked to provide comments on the subject matter involving a parcel of Very Low Sulphur Fuel Oil (VLSFO), totalling 260.41 MT, stemmed by the vessel SHANGHAI from the bunker barge KIRBY 27735 on 25 April 2022 at New Orleans, USA. However, and whilst analysis of barge line samples found the fuel to meet ISO 8217:2017 specifications, analysis of vessel manifold and vessel heavy fuel oil (HFO) vessel tank samples found the subject bunkers to be off-specification due to high catfine (aluminium and silicon) contents, resulting in Owners of the vessel refusing to consume the subject fuel.

1.4 Specifically, I have been asked to comment upon the results of the fuel testing, test method precision and the procedure for bunker fuel sampling during delivery.

CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

2.0 ISO 8217:2017 TABLE 2 ANALYSIS OF VESSEL MAINFOLD AND BARGE LINE SAMPLES

2.1 The results of full ISO 8217:2017 Table 2 analysis of the vessel manifold and barge line samples are provided in Table 1 (*see below*).

Parameter	Units	Vessel Manifold Continuous Drip 0273939 / 0300780 25/04/22 Intertek	BDN (Barge External Line Sample) 0153995 (original seal 1191919) 12/10/22 NMK	BDN (Barge External Line Sample) 1191920 12/10/22 NMK	ISO 8217:2017 RMG 380 cSt Specification Limit
Density at 15°C	kg/m^3	931.0	931.1	931.0	Max. 991.0
Kinematic Viscosity at 50°C	cSt	37.56	43.45	42.23	Max. 380
Flash Point	˚C	> 70.0	106	106	Min. 60
Pour Point	˚C	27	24	24	Max. 30
Micro Carbon Residue	% m/m	3.07	3.09	3.16	Max. 18
Ash	% m/m	0.074	0.018	0.020	Max. 0.100
Water	% v/v	0.15	<0.05	<0.05	Max. 0.50
Sulphur	% m/m	0.47	0.479	0.486	Max. 0.50
TSP	% m/m	0.05	0.06	0.07	Max. 0.10
TSA	% m/m	-	0.04	0.05	-
Sodium	mg/kg	48	16	13	Max. 100
Vanadium	mg/kg	7	5	5	Max. 350
Nickel	mg/kg	7	7	7	-
Aluminium	mg/kg	60	14	13	-
Silicon	mg/kg	58	17	17	-
Aluminium + Silicon	mg/kg	**118**	31	30	Max. 60
Calcium	mg/kg	29	17	17	Max. 30*
Zinc	mg/kg	7	5	5	Max. 15*
Phosphorous	mg/kg	8	5	5	Max. 15*
CCAI	-	822	820	820	Max. 870
Acid Number	mg KOH/g	0.20	0.21	0.26	Max. 2.5

* Phosphorus, calcium and zinc are markers for used lube oil (ULO). A fuel is only considered to be off-specification for ULO when either calcium and zinc or calcium and phosphorus are at levels higher than the advised maximum specification limit.

Table 1. ISO 8217:2017 Table 2 analysis results of the vessel manifold and barge line samples from the SHANGHAI

CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

2.2 Review of the results for the two BDN (barge line) samples tested at NMK indicates that both samples were found met ISO 8217:2017 Table 2 specifications, including for catfine content. Furthermore, the results of the two BDN samples were found to be comparable to one another, which would suggest that the two samples were likely representative of the same bunker fuel.

2.3 It is also the case that save from ash, catfines, sodium and calcium content, the other results (including fingerprint parameters such as density, viscosity, sulphur content, vanadium and nickel content) determined for the vessel manifold sample previously tested also compared well with the BDN samples. In view of the closeness of the fingerprint values determined across the three samples tested, it would support a view whereby the vessel manifold and the two BDN samples likely represented the same bunker fuel.

2.4 It should be noted that continuous drip manifold samples would be the most representative samples for determining the quality of the subject bunker fuel as supplied to a vessel. This method of sampling is also stated in ISO 13739, the sampling method which ISO 8217:2017 refers to with respect to taking samples for quality verification. By contrast, a "spot" sample is a fuel sample taken at a discrete point in time during the bunkering operation and would only represent the bunkers flowing over the sampling point at the time the sample was taken and would not be representative of the entire bunker stem delivered.

2.5 By way of background, continuous manifold drip samples are taken throughout the entire bunkering operation and are generally collected in a 5-litre bulk bag. Following completion of the bunkering operation, the bulk sample will be sub-divided into individual samples of circa 750ml. The expectation is thus that results obtained from analysing the individual samples obtained via the continuous drip method from the same manifold should be very similar to each other. See section 4 below which contains a detailed discussion of taking a continuous drip sample of bunkers.

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

2.6 In view of the continuous drip sampling methodology, the expectation is that if samples were drawn correctly from both the barge and the vessel manifolds during the same operation, that the results of the samples should be comparable.

2.7 Ash content, catfines content, sodium and calcium content are all parameters that would be considered as non-homogenous species in bunker fuels. If the bulk sample (drawn by the continuous drip method) is not properly homogenised prior to decanting the individual samples, it is possible for the level of non-homogeneous species to differ significantly between the individual samples, even though they are all borne from the same bulk continuous manifold drip sample.

2.8 Whilst the vessel manifold sample is described as a continuous drip manifold sample, and therefore is likely to have been drawn in the manner set out at paragraph 2.5 above, the BDN samples are described as barge external line samples. If the BDN samples were spot samples, I advise that such samples would only have represented the material flowing over the sampling point at the time the sample was taken and would not be representative of the entire stem delivered.

2.9 Given that the fingerprint parameters of the vessel manifold and barge line samples were found to be comparable, apart from the non-homogenous species, including catfines, this would suggest, in my opinion, that it is probable that the subject fuel was non-homogenous in nature.

2.10 I also consider it unlikely that residues of a previous stem in the bunker hose used to transfer the fuel from the barge to the vessel played a significant, if any, contributory part. Firstly, it is worth noting at this juncture that the transfer hoses are self-draining, meaning that only trace amounts of the previously transferred fuel would remain present. Further, if the hose did contain significant remnants of previous fuel, which is deemed unlikely, it would have affected a number of parameters and not just catfine content.

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE 新加坡
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

2.11 Lastly, it is worth noting that the maximum permissible catfine content under ISO 8217:2017 is 60 mg/kg. Therefore, in order to achieve a final catfine content of 118 mg/kg and considering the limited capacity of the flexible transfer hose, it must have contained material with a catfine content orders of magnitude higher than 60 mg/kg.

2.12 In addition to the barge and vessel manifold samples, further testing of an upper, middle and lower level (UML) composite sample taken from HFO tank #3 at Intertek Bahamas (that is the Vessel's fuel tank #3) also indicated that the catfine content of the subject bunkers on the vessel were high, with results of same provided in Table 2 (*see below*).

Parameter	**Units**	**SHANGHAI HFO Tank #3 UML Composite 07/05/22 Intertek**	**ISO 8217:2017 RMG 380 cSt Specification Limit**
Density at 15°C	kg/m^3	899.9	Max. 991.0
Kinematic Viscosity at 50°C	cSt	40.19	Max. 380
Flash Point	°C	108.0	Min. 60
Pour Point	°C	30	Max. 30
Micro Carbon Residue	% m/m	3.30	Max. 18
Ash	% m/m	0.023	Max. 0.100
Water	% v/v	0.20	Max. 0.50
Sulphur	% m/m	0.50	Max. 0.50
TSA	% m/m	0.10	-
Sodium	mg/kg	61	Max. 100
Vanadium	mg/kg	7	Max. 350
Aluminium	mg/kg	49	-
Silicon	mg/kg	50	-
Aluminium + Silicon	mg/kg	**99**	Max. 60
Calcium	mg/kg	27	Max. 30*
Zinc	mg/kg	16	Max. 15*
Phosphorous	mg/kg	8	Max. 15*
CCAI	-	789.5	Max. 870
Acid Number	mg KOH/g	0.25	Max. 2.5
Hydrogen Sulphide	mg/kg	<0.40	Max. 2.00

* Phosphorus, calcium and zinc are markers for used lube oil (ULO). A fuel is only considered to be off-specification for ULO when either calcium and zinc or calcium and phosphorus are at levels higher than the advised maximum specification limit.

Table 2. ISO 8217:2017 Table 2 analysis results of the HFO tank #3 UML composite sample from the SHANGHAI

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

2.13 By way of background, upper, middle and lower level samples will be taken at 1/6th, 1/2 and 5/6th the depth of the tank, following which an equal proportion UML composite sample will be prepared. UML composite samples are therefore considered representative samples which should provide an accurate indication of the overall quality of the tank sampled.

2.14 The above, combined with the fact that HFO tank #3 contained only 0.117 MT of ROB (that is bunkers "remaining on board" in tank #3) prior to the bunker operation, makes it unlikely that any significant commingling of bunkers upon loading played a role, and supports the view that the bunkers were delivered to the vessel with an inherently high catfine content. The reports of elevated catfine material within the UML composite sample (from Vessel fuel tank #3) would also support the view that the barge samples did not accurately represent the overall quality of the fuel oil delivered.

2.15 On basis of the above, in my opinion, the results of the analysis indicate that the differences in catfine content between the vessel manifold and barge line samples are likely due fuel being non-homogeneous in nature.

3.0 TEST METHOD PRECISION

3.1 When comparing results of two samples with one another, we can determine whether or not results are significantly different (and therefore likely different due to reasons other than inherent test method variance) by looking at the repeatability or the reproducibility of the method for the parameter in question.

3.2 Reproducibility is the value equal to or below which the absolute difference between two single test results obtained in the normal and correct operation of the same method on identical test material but under different test conditions (different operator, different apparatus, different laboratory) that can be expected to lay with a probability of 95%.

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

3.3 For IP 501 (the test method used for determining elements such as aluminium and silicon), the reproducibility for aluminium content is 0.337x (where x is the average of the results) and for silicon content is 0.332x (where x is the average of the results). The reproducibility for catfine content (Al + Si) would therefore be the sum of the two individual reproducibility.

3.4 With respect to the barge line samples, three samples were analysed for catfine content, with one of the samples being analysed twice. The four results reported were 17 ppm, 30 ppm, 31 ppm and 34 ppm and the reproducibility of the results was 8 – 11 ppm depending on which results are being compared.

3.5 Whilst the two NMK (30 and 31 ppm) and the Intertek (34 ppm) results for the barge line samples were all found to be within reproducibility of each other, the result for the barge line sample tested at AmSpec (17 ppm) was not, and therefore same would be considered significantly different to the other three barge line sample results.

3.6 Nevertheless, it should be kept in mind that catfines are a non-homogeneous contaminant in bunker fuels hence the results of same can be affected by samples not being properly homogenised prior to sub-sampling, either after the bulk sample was drawn or in the laboratory when a portion of fuel is taken for the test.

3.7 However, given that the barge samples are simply referred to as external line samples rather than continuous drip samples, it is probable that, as mentioned at paragraph 2.8 above, the samples from the barge are 'spot' samples, which are only representative of the product at the point and time the sample is taken, rather than the entire fuel oil stem (as is the case with continuous drip samples).

3.8 On basis that the barge samples are likely spot samples, I would not be surprised that the catfine results do not compare well with the vessel manifold and vessel tank samples. As discussed above, catfines are non-homogenous and as such would not be evenly distributed within a fuel, meaning that the various spot samples would

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE 新加坡
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

essentially be representative of different portions of fuel which may have different levels of catfines.

3.9 All four barge line sample results were found to be outside reproducibility when compared with the vessel manifold continuous drip sample, indicating that the barge samples were significantly different to the vessel manifold sample insofar catfine content was concerned.

3.10 With the other fingerprint parameters of the fuel being comparable between the vessel manifold and barge line samples, it is likely that the barge line samples underestimated the catfine content of the fuel delivered due to the manner in which the barge samples were drawn. If the fuel contained high levels of catfines and most of them had settled in the barge tanks, some parts of the fuel would have high levels of catfines whereas others would have low levels of catfines, the latter of which was likely sampled when the external line (spot) samples were drawn by the barge. (See paragraph 2.4 above for a description of a spot sample).

3.11 With regards to the results for the shoretank ST 910 sample, I advise that same is not considered to be equivalent to continuous manifold drip samples drawn during bunkering, results of which are provided in Table 3 (*see overleaf*) along with the vessel manifold sample for comparison.

3.12 Bunker barges do not wash their tanks regularly and generally tend to load fuel oil cargoes on top of existing ROB amounts of previous fuel oil products, hence there is a possibility that commingling of different fuel oil stems can occur and thereby affect the quality of the fuel oil. Additionally, the condition of the shoreline connecting the shore tank and the jetty header where the barge will load the fuel oil from is unknown, meaning that the introduction of an unknown quality of fuel through this mechanism cannot be eliminated either.

3.13 However, in the subject matter, it is the case that the shoretank ST 910 sample does in fact show comparable results to that of the vessel manifold sample save for catfine and

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

ash content (the latter likely being affected as a result of the high catfines). As such, there is no indication of any significant commingling or introduction of another product into the subject bunkers between loading from the shoretank and at the point of delivery to the vessel.

3.14 Nevertheless, whilst the shoretank sample cannot be used to evidence the quality of the fuel at the point of delivery to the vessel, the results can still be used to evidence the non-homogenous nature of the subject fuel.

Parameter	Units	Shoretank ST 910 UML Composite After Transfer 30 March 2022	SHANGHAI Vessel Manifold Continuous Drip 0273939 / 0300780 25 April 2022	ISO 8217:2017 RMG 380 cSt Specification Limit
Density at 15°C	kg/m^3	926.7	931.0	Max. 991.0
Kinematic Viscosity at 50°C	cSt	42.55	37.56	Max. 380
Flash Point	°C	100.6 (213 °F)	> 70.0	Min. 60
Pour Point	°C	27	27	Max. 30
Micro Carbon Residue	% m/m	3.28	3.07	Max. 18
Ash	% m/m	0.020	0.074	Max. 0.100
Water	% v/v	0.05	0.15	Max. 0.50
Sulphur	% m/m	0.460	0.47	Max. 0.50
TSP	% m/m	0.04	0.05	Max. 0.10
TSA	% m/m	0.03	-	-
Sodium	mg/kg	25	48	Max. 100
Vanadium	mg/kg	5	7	Max. 350
Aluminium	mg/kg	10	60	-
Silicon	mg/kg	20	58	-
Aluminium + Silicon	mg/kg	30	**118**	Max. 60
Calcium	mg/kg	19	29	Max. 30*
Zinc	mg/kg	5	7	Max. 15*
Phosphorous	mg/kg	2	8	Max. 15*
CCAI	-	816	822	Max. 870
Acid Number	mg KOH/g	0.16	0.20	Max. 2.5
Hydrogen Sulphide	mg/kg	<1	-	Max. 2.00

* Phosphorus, calcium and zinc are markers for used lube oil (ULO). A fuel is only considered to be off-specification for ULO when either calcium and zinc or calcium and phosphorus are at levels higher than the advised maximum specification limit.

Table 3. ISO 8217:2017 Table 2 analysis results of the shore tank ST 910 sample and vessel manifold continuous drip samples from the SHANGHAI

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

3.15 Similarly, the barge tanks 3P and 3S samples, which reported catfine contents of 30 ppm and 24 ppm respectively, are also not considered to be equivalent to the samples drawn during bunkering.

3.16 Whilst the barge tank samples, which were drawn from the bunker barge KIRBY 27735 on 5 April 2022 after loading from shore tank ST 910, are noted to be running samples, due to the viscous nature and presence of non-homogenous species in the fuel (including catfines), it is unlikely that such samples would be representative of the overall bulk fuel. It is also the case that the barge tank samples were tested for catfine content only and not any other ISO 8217:2017 Table 2 parameter, hence it is not possible to compare fingerprint parameters to confirm whether the barge samples and manifold samples are in fact from the same bunker stem.

3.17 Furthermore, the bunker fuel delivered to the vessel would be a mixture of the fuel from both tanks therefore the separate results for the two individual tanks would not be representative of the quality of the fuel actually being delivered to the vessel. As such, the individual barge tank results cannot be compared to barge line and vessel manifold samples on a statistical basis.

4.0 PROCEDURE FOR BUNKER FUEL SAMPLING DURING BUNKERING OPERATIONS

4.1 The ISO 8217:2017 specification, which the subject bunkers were supplied under, references the ISO 13739 standard with regards to sampling of bunker fuels for analysis.

4.2 ISO 13739 '*Petroleum products – procedures for the transfer of bunkers to vessels*' specifies procedures and requirements for the transfer of bunkers to vessels, including

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE 新加坡
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

guidance on sampling in order to obtain a representative sample of the delivered bunkers. In particular, Section 9.2 and Annex L of the standard states the following:

9.2 Sampling procedure and equipment

9.2.1 *The sampling procedure is given in Annex L.*

9.2.2 *A single sample shall be drawn continuously throughout the delivery, from either end of the bunker hose, using an automatic sampler or a continuous drip sampling device (see Annex M). The guidelines for the sampling of fuel oil for compliance with Annex VI of MARPOL 73/78 are for the sample to be drawn by the Cargo Officer, using a sampling device at the receiving vessel's inlet bunker manifold. It is recommended that the commercial samples and the MARPOL sample be derived from this single sample.*

…

Annex L (normative)

Sampling Procedure

L.1 *The procedure for bunker sampling shall be as given in L.2 to L.11*

L.2 *Before delivery of bunkers, the Cargo Officer and the Chief Engineer shall inspect the sampling equipment as given in Annex K.*

L.3 *The shall jointly ensure that the volume of the sample container is adequate to fill the number of sample bottles as agreed. They shall also ensure the sampling container is clean before fixing it to the end of the sampling probe.*

L.4 *After the Cargo Officer and the Chief Engineer are satisfied that the sampling equipment meets the details given in Annex K, the sampling container shall be securely*

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE 新加坡
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

sealed in the presence of the Cargo Officer and the Chief Engineer. The seal number shall be recorded on the tank measurement/calculation form (see Annexes H and I).

L.5 *Where a continuous drip sampler is used, the Cargo Officer and the Chief Engineer shall witness the setting of the needle valve on the sampling probe to ensure that a continuous-drip sample is collected throughout the entire duration of bunkering.*

Unless otherwise agreed, the needle valve on the sampling probe shall be sealed in the presence of the Chief Engineer at the commencement of bunkering and the seal number recorded on the tank measurement/calculation form (see examples in Annexes H and I). Sampling shale start simultaneously with the commencement of the bunkering operation. When any adjustment of the needle valve is required, the Cargo Officer and the Chief Engineer shall witness the adjustment and record the change of seal number.

L.6 *Upon completion of bunkering, the Cargo Officer and the Chief Engineer shall confirm that the security seals of the sampling container and the needle valve are not tampered with.*

L.7 *After the Cargo Officer and the Chief Engineer are satisfied with the sample collected in the sampling container, the sample shall be thoroughly shaken or stirred to promote homogeneity.*

L.8 *The sample is then poured in small, equal portions into at least four sample bottles, making three or four passes to fill each bottle in turn to obtain nominally identical samples. The minimum quantity in each sample bottle shall be 750 ml.*

L.9 *These sample bottle shall be distributed as follows:*

a) two for the vessel, one of which is a MARPOL sample;

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE 新加坡
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

b) two retained by the bunker tanker;

c) one for the Bunker Surveyor, if engaged;

d) one for fuel testing services, if required.

If the Cargo Officer and the Chief Engineer agree that additional bottles should be filled from the sample, their distribution and seal numbers shall also be recorded.

L.10 *All sample bottles shall be closed and sealed in the presence of the Cargo Officer and the Chief Engineer. The seal numbers and, if used, counter seal numbers of all samples taken during this bunkering shall be recorded on the respective sample labels and on the bunker delivery note.*

L.11 *On completion of the bunkering and sampling operations, sample labels shall be completed, signed, stamped and pasted on the respective sample bottles by the Cargo Officer and the Chief Engineer. No sample labels shall be signed and stamped prior to the completion of the bunkering and sampling operations.*

4.3 Paragraph 9.2.2 of the ISO 13739 standard indicates that a continuous drip sample should be drawn from either end of the bunker hose (i.e., barge manifold or vessel manifold) during the bunker operation and that such samples would be considered representative of the subject bunkers at the point of delivery.

4.4 Furthermore, the IMO MEPC Circular 875 '*Guidance on best practice for fuel oil suppliers for assuring the quality of fuel oil delivered to ships*' also provides guidance on the process for obtaining representative samples of a bunker fuel when delivered to a vessel. In particular, Section 9 of the circular states the following:

9 Representative sampling

9.1 *Sampling is an integral part of quality control and vital in protecting the interest of all parties involved. Samples may be used as evidence both for commercial,*

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

regulatory or even criminal disputes and in court cases. The objective is to obtain samples that are truly representative of the product being transferred, both during delivery to ship and upstream in the supply chain as appropriate prior to the bunker delivery.

9.2 *To ensure samples are representative, a single primary sample for each grade of fuel delivered from each tanker/barge or truck should be drawn continuously throughout the entire product transfer by either an automatic sampler or manual continuous drip sampler.*

9.3 *While a fuel oil supplier may use ISO 13739 and ISO 3171 for automatic pipeline sampling, ISO 3170 for manual methods or some other protocol for obtaining samples, it should be remembered that MARPOL Annex VI sets out the procedures for compliance and enforcement which includes resolution MEPC.182(59) on the 2009 Guidelines for the sampling of fuel oil for determination of compliance with the revised MARPOL Annex VI.*

9.4 *The sample taken during delivery or from a tank should be collected in a clean container of sufficient quantity to be divided into the required number of sub-samples which in turn should be sufficient to carry out the required tests, typically 500-750 ml per sub-sample and in any case no less than 400 ml.*

9.5 *The contents of the single original sample should be decanted into the required number of clean sub-sample containers. This will typically involve agitating the bulk container and partially filling each sub-sample container in turn to a quarter or a third of their capacity, then repeating the process (agitating and decanting) until all the sub-sample containers have been filled.*

9.6 *The entire process, including sealing and labelling the sample containers, should be witnessed by representatives for both parties (the party supplying a cargo or product and the receiving party) and the resulting unique sample seal numbers*

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

recorded on the relevant documentation (e.g. the BDN) and countersigned by representatives for both parties.

9.7 *Employing the services of an independent surveyor to oversee and witness the process may also be considered, in which case all sample seal numbers pertaining to the sampling should be recorded by the bunker surveyor in the sample witnessing and receipt.*

Sampling in the supply chain

9.8 *Sampling and testing should be carried out and documented at each point of product custody transfer throughout the supply chain.*

9.9 *A representative sample should be collected when loading bunker supply ships from shore tanks, floating storage facilities and tankers. The recommended method is a sample drawn throughout the loading at the point of custody transfer. The sampling should be witnessed and the resulting sample containers sealed, labelled and countersigned by representatives for both the cargo recipient and the tank terminal.*

9.10 *The supplier should retain the cargo transfer samples for at least 30 days. In the event of a quality dispute arising, samples should be kept until the dispute has been resolved.*

Sampling during delivery to ship

9.11 *Suppliers should follow the 2009 Guidelines for the sampling of fuel oil for determination of compliance with the revised MARPOL Annex VI (resolution MEPC.182(59)) which states that the supplier should provide a MARPOL sample drawn by the supplier's representative at the receiving ship's bunker inlet manifold.*

9.12 *If for safety or practical reasons the supplier's representative cannot move between the barge and the receiving ship to be physically present, the process may be observed visually by alternative means.*

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE
新加坡
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

9.13 *To facilitate effective remote witnessing of drawing of commercial samples, visibility of the sampling equipment on bunker barge can be improved by marking the sampling zone with high visibility tape or paint.*

9.14 *The final resulting sample containers should be sealed, labelled and countersigned by representatives for both parties.*

9.15 *The supplier's representative commercial samples should be retained by the supplier for a minimum of 30 days. In the event of a quality dispute arising during the sample retention period, the samples should be retained until the dispute has been resolved.*

4.5 Similar to ISO 13739, paragraph 9.2 of the IMO MEPC Circular 875 states that for a sample to be representative of the material delivered, it should be drawn continuously throughout the product transfer by either an automatic or manual continuous drip sampler.

4.6 Given that the BDN samples drawn from the barge are described as external line samples rather than a continuous drip manifold sample (as the vessel manifold samples are), it is likely that the BDN samples were not drawn in the correct manner.

4.7 In addition, paragraph 9.11 of the circular states that the MARPOL sample (which can be used for determination of whether the fuel complies with MARPOL Annex VI) has to be drawn at the receiving ship's bunker inlet manifold, which in this case would be the manifold of the SHANGHAI.

4.8 Notwithstanding the above, it is also noted that paragraph 9.2.2 of ISO 13739 recommends that the commercial samples and the MARPOL sample should be derived from the same sample. As such, it would therefore be the case that the samples drawn from the vessel manifold should equally be representative for the determination of the fuel quality at the time of delivery.

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

4.9 As such, on basis of the above, the samples drawn from the vessel manifold would be representative of the fuel at the time of delivery and therefore the results of same should also be taken into account when determine the quality of the subject bunkers.

4.10 Furthermore, given that it is probable that the BDN samples were not drawn in the correct manner as well as the vessel storage tank sample showing equally high levels of catfines, in my opinion, the vessel manifold sample would be considered to be the samples that are representative of the actual quality of the bunkers supplied to the vessel.

I affirm and state under the penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on: the 1st day of February 2023 at Antwerp, Belgium.

Mr Pierre de Jager
MChem CHons RSci, MRSC
Director
CWA International Ltd

CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

APPENDIX

CV OF MR PIERRE DE JAGER

Pierre Johannes De Jager

Qualifications	MChem CHons in Medicinal Sciences, University of Southampton
Affiliations	Member of the HMC 3 Committee, Energy Institute, advising on petroleum measurement and standards. Registered Scientist, RSci Member of Royal Society of Chemistry, MRSC Member of the Energy Institute, MEI
Date of Birth	1985
Nationality	British
Contact	cwa@cwa.uk.com http://www.cwa.international +44 (0) 20 7242 8444

Current Position at CWA

Chemist / Surveyor

Pierre joined CWA's Oil and Chemicals department as a Chemist, having completed his Masters in Chemistry at Southampton University and became a Director in 2019. His academic background included Organic, Inorganic and Physical Chemistry as well as Pharmacology. Pierre has also considerable laboratory experience, in particular, in the field of electrochemistry where he worked on modifying platinum microelectrodes to optimise oxygen concentration measurement at sea. Furthermore, Pierre's analytical lab experience also covers a broad range of lab testing skills in the petroleum sector including modern chromatography and spectroscopy techniques together with advanced microscopy (scanning electron microscopy) studies. Pierre is the CWA representative serving on the Energy Institute HMC 3 Committee advising on aspects of petroleum measurement and custody transfer. Expert witness.

CWA INTERNATIONAL

CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE 新加坡

CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914

Specific Expertise and Experience at CWA

Process Materials and Cargoes

Pierre has experience of attending and advising on contamination incidents affecting a number of cargoes, including Gas carrier cargoes, Ethane, LPG-propane/Butane; Isoprene, Butadiene, Ammonia; VCM; Chemical carrier cargoes including: Acetone; Palm oil (olein, stearine, kernel oil); Rapeseed Oil (all grades): Sunflower Oil (all grades): Benzene, Toluene, Xylene (BTX) aromatics; Hexamethylenediamine (HMD); Hexene; Methanol; Mono, Di and Tri ethylene glycol (MEG, DEG, TEG), Acrylonitrile (ACN), Caustic Soda, Ethanol, Phosphoric acid and Petroleum cargoes including, Very Low Sulphur Fuel Oil (VLSFO); Crude oils; Slurry Oil; Jet A-1; Fuel oil (light, medium, heavy); Bitumen; Gas oil/Diesel grades; Gasoline (all grades) Naphtha; Methyl tertiary – butyl ether (MTBE).

Pierre has also given evidence in several Arbitration and High Court matters involving residual marine bunker fuel oil grades where contamination by chemical species identified by gas chromatography mass spectrometry and other investigative techniques were alleged.

Field Attendances

Pierre has attended Gas carriers, Oil/Chemical tankers, bulk carriers and container ships, and numerous Laboratories and Refineries. Attendance assignments include Odessa; Kirovograd, Ilyichevsk, Europort, Immingham, Santos, Rotterdam, Antwerp, Le Havre, Iskenderun, Jebel Ali, Fujairah, Sohar, Las Palmas, Sharjah, Dubai, Southampton, Teesport, Thurrock, Nigeria, Malaysia, Aruba, Mozambique, Santa Domingo, Singapore, Shanghai, Ningbo, South Africa, Spain, Portugal, Bermuda, Curacao, Gibraltar, Zhangjiagang, Hong Kong, Grangemouth, Rafnes, Nyborg, Denmark and other European countries. Surveying experience includes inspection of cargo tanks, ballast tanks, tank suitability conditioning surveys, inspection of steam heating coil systems, pressure testing of gas carrier liquefaction plant, along with various sampling techniques used aboard vessels. Pierre has also advised on alleged VLSFO contaminations, water contamination incidents and undertaken supervision of de-bottoming operations of petroleum products and edible oils. Bulk ship hatch and hold survey, suitability survey to load to grain standard. Container dangerous goods survey for self-ignition incident; IMDG Code mis-declaration survey.

Summary of Previous Employment

July 2010 – December 2010 **Merck Chemicals**
Southampton

Development, formulation and printing of organic light emitting diodes. Responsibilities included analysing data collected from experiments, formulating polymer photoresists and organic light emitting diode inks. Results of this assignment were used to optimise processes such as formulation of low surface energy photoresists and to improve the interaction of organic light emitting diode inks on various substrates. Co-inventor of low surface energy photoresists (patent pending).

CWA INTERNATIONAL
CWA International Ltd
5th Floor, 42 Trinity Square
London EC3N 4DJ
United Kingdom

CWA SINGAPORE 新加坡
CWA Singapore Pte Ltd
160 Robinson Road
#23-04 SBF Center
Singapore 068914